

## First record of *Metacyclops stammeri* Kiefer, 1938 from Balkan Peninsula

(Crustacea, Copepoda)

Tomislav Karanovic

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The cyclopoid copepod *Metacyclops stammeri* Kiefer, 1938 (Copepoda, Cyclopoidea) is recorded from Balkan Peninsula for the first time. This species was known only from the Apulian region in the southern part of Italy. A detailed description of that interesting Tertiary relict is given.

Tomislav Karanovic, Institute of Marine Biology, P.O. Box 69, 85335 Kotor, Montenegro, Yugoslavia

### Introduction

*Metacyclops* was first established as a subgenus of the genus *Mesocyclops* by Kiefer (1927, 1928), and later as a genus (Kiefer 1937, 1960). Lindberg (1961) redefined the genus *Metacyclops* and also gave a key to females. He emphasized the distinctive features of that genus. One unsuccessful attempt to unite the three genera *Apocyclops*, *Psammophilocyclops*, and *Metacyclops* as subgenera of the genus *Metacyclops* was made by Plesa (1981). This grouping was followed by Pesce (1985a), but Reid (1987) showed the unnecessary of that attempt. Forty-seven currently recognized taxa were listed in a world key by Herbst (1988), together with their geographical distribution. Reid (1991) added to the above list *Mesocyclops pseudoanceps*, which proved to be a *Metacyclops*. Recently described species and subspecies not included in Herbst's key are: *M. postojnae* Brancelj, 1987 from Slovenia; *M. janstocki* Herbst, 1990 from Antigua; *M. leptosus totaensis* Reid et al. 1990 from Colombia; *M. cushae* Reid, 1991 from the United States; *M. oraemaris* Rocha, 1994 from Brazil; *M. hirsutus* Rocha, 1994 also from Brazil; *M. mendocinus insulensis* Defaye & Dussart, 1991 from the Azores; and *M. geltrudeae* Galassi & Pesce, 1994 from Venezuela. Therefore, now the genus *Metacyclops* includes fifty-six species and subspecies of which the majority are tropical and temperate in distribution.

Kiefer (1938) described two species of the genus *Metacyclops* from the Apulian region in Italy: *M. subdolos* and *M. stammeri*. *M. subdolos* was latter rediscovered in Apulia (Pesce et al. 1978), and was also found on the Balears, on Corsica and in Greece (Lindberg 1956, Pesce 1978, 1983, Pesce & Maggi 1981, 1983). *M. stammeri* was also rediscovered in several localities in Apulia (Pesce et al. 1978), but was never found outside that region. During an investigation of the copepod fauna in Montenegro two males of *Metacyclops stammeri* were found. It is the first record of that species from Balkan Peninsula.

### Methods

Samples were collected with different types of hand-nets and little rubber pumps. The material was preserved by adding several drops of 36% formaldehyde, and very soon after that washed, and copepods were separated and removed into 70% ethanol. One specimen was dissected in a mixture of distilled water and glycerol (1:1),

with fine entomological needles. All drawings have been prepared using a drawing attachment on a Leica DMLS microscope with C-PLAN achromat objectives. Dissected appendages were preserved in Faure's medium. The not dissected specimen was, after examination, again preserved into 70 % ethanol.

Abbreviations used in the text and figures: Fu: furca; A1: antennula; A2: antenna; Mx: maxilla; P1-P6: 1<sup>st</sup>-6<sup>th</sup> leg; Enp: endopodite; Exp: exopodite; Enp2P4: second endopodite article of the 4<sup>th</sup> leg.

## Results

### *Metacyclops stammeri* Kiefer, 1938

*Metacyclops Stammeri* Kiefer, 1938, p. 7, figs 11-17;

*Metacyclops stammeri*, Lindberg 1961, p. 142; Dussart 1969, p. 173, fig. 85; Pesce et al. 1978, p. 37, fig. 5; Kiefer 1978, p. 215; Pesce 1985, p. 135; Dussart & Defaye 1985, p. 100; Lescher-Moutoué 1986, p. 308; Herbst 1988, p. 150.

**Material examined:** Two ♂♂ from the cave Sutimska Jama (42°25'50" N, 19°10'40" E), near the town Podgorica, Montenegro, collected by T. Karanovic, 3 February 1997. One ♂ was completely dissected and mounted on a slide in Faure's medium (No. 8/66/0584/i). The other ♂ is preserved in 70 % ethanol in a glass test tube (No. 7/0584/i). Both specimens are deposited in the author's working collection, at the Institute of Marine Biology, Kotor, Montenegro.

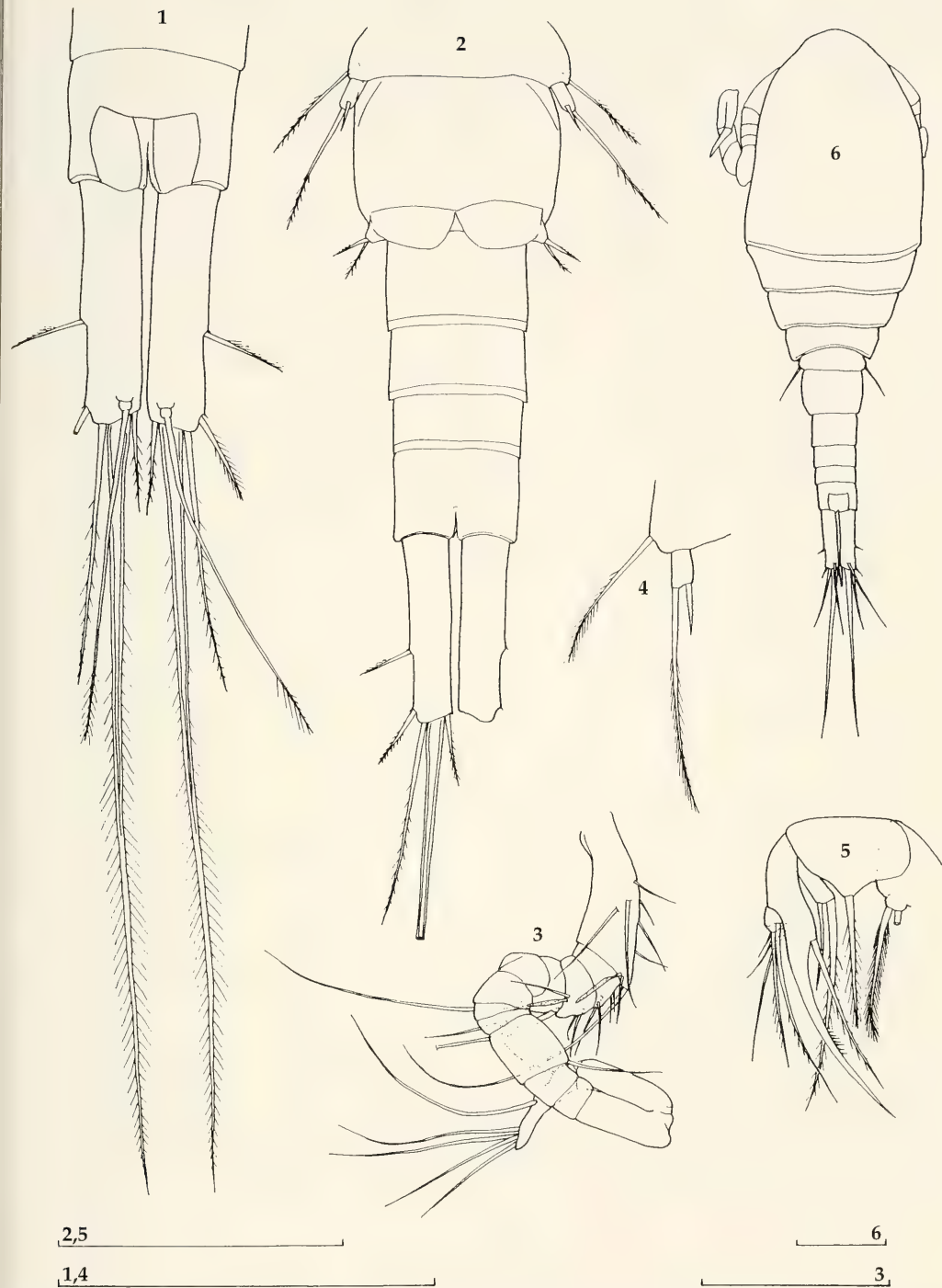
## Description

**Male.** Length of dissected specimen, including furcal rami (excluded furcal setae) 0.54 mm. Length of non-dissected specimen 0.593 mm. Body surface without patterns of cuticle striae or setulose areas, and colourless. Nauplius eye absent. Hind margin of each body segment smooth and without rows of spines (Fig. 6). Cephalothorax very long (longer than thoracic somites and four abdominal somites together). Anal somite also without rows of spines at the base of furcal rami, both ventrally and dorsally (Figs 1, 2). Anal operculum very short and broad. Furcal rami parallel, close, and about 4 times longer than wide (Fig. 1). Lateral seta inserted at distal three-fifths of ramus. Apical setae with following proportion of lengths (from outside to inside: 1/2.8/8.4/1. Inner-middle seta (the longest one) swollen at base, and without cuticular pint. Dorsal seta attached almost at the end of the furcal ramus, and about 1.4 times longer than it. That seta is also longer than outer-middle seta (Fig. 1). A1 geniculate, 14-segmented, and with aesthetascs only at first and third segments (Fig. 3). A2 4-segmented, with well-developed exopodite seta, and without rows of spines or hairs on the first segment (Fig. 10). All swimming legs with 2-segmented exopodites and endopodites. Spine formula of distal exopodite articles P1-P4: 3.4.4.3; setal formula of those articles: 5.5.5.5 (Figs 7, 9, 11, 12). Enp2P4 approximately 3.2 times as long as width, apically armed with outer spine and inner plumose seta (which is more than twice longer than spine). Intercoxal plates in all swimming legs smooth and without hairs or spinules. P5 consisting of 1 fused and 1 free article (Fig. 4). Free article longer than width, armed apically with very long outer plumose seta, and inner spine (which is about 1.3 times longer than article that bears it). Seta on free article 1.5 times longer than seta on fused article. P6 armed with two appendages: inner spine and outer seta (Fig. 8).

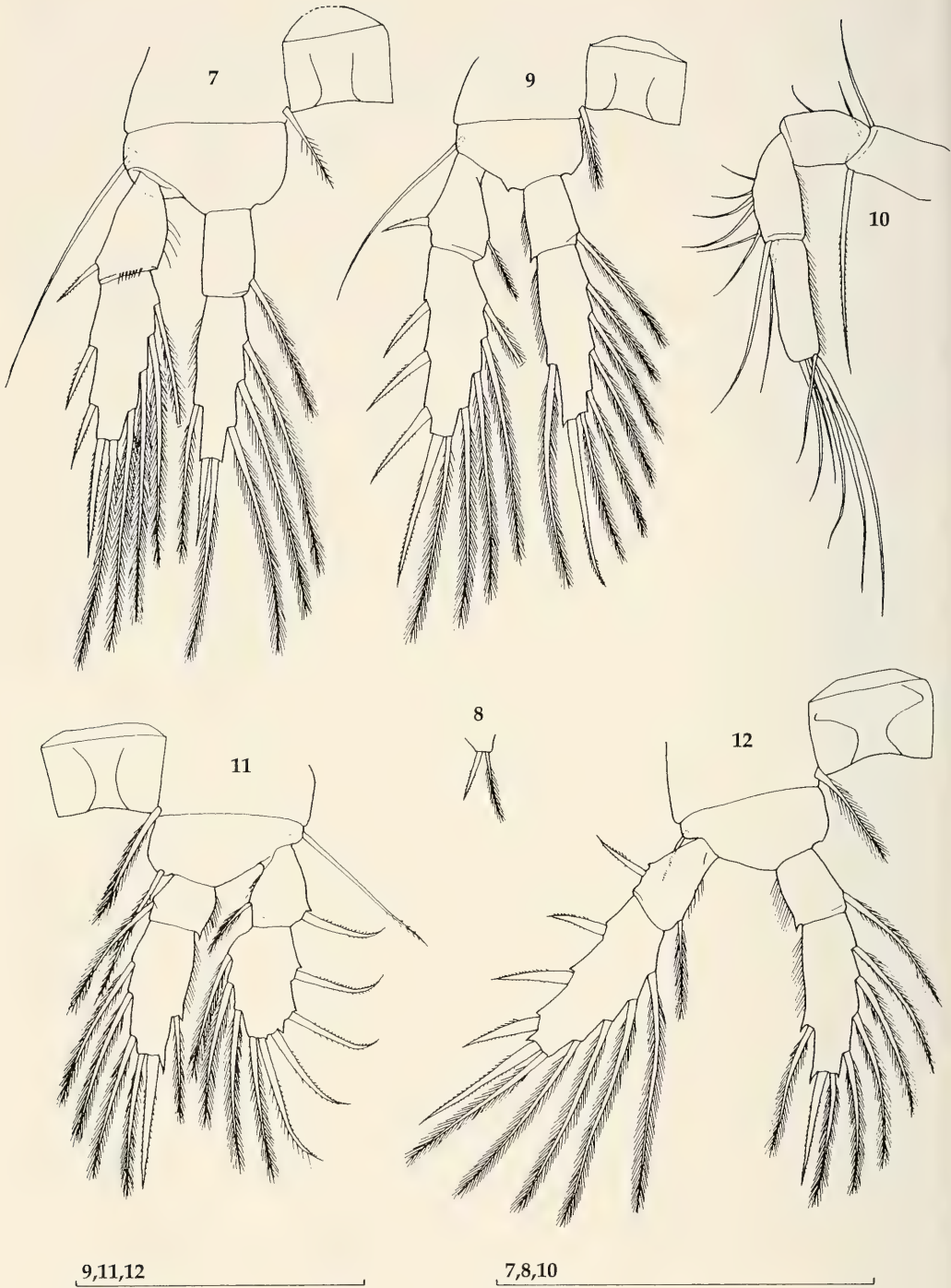
## Discussion

Kiefer (1938) described *M. stammeri* from three caves (La Zinzuleisa, Abissa, and Grotta dei Diavoli), south from the town Otranto, in the Apulian region of southern Italy. Pesce et al. (1978) rediscovered it in the same caves, and also on four additional localities near the town Gallipoli, also in the Apulian region (Fig. 13), although their geographical coordinates are erroneous. Dussart & Defaye (1985) by mistake recorded the species from Corsica, Sicily, and Sardinia, as well as Herbst (1988), probably because of the wrong interpretation of Kiefer (1978). Specimens from Montenegro are very similar to those from the Apulian region, and there is no doubt of their specific status. They differ just by a little longer dorsal setae on Fu.

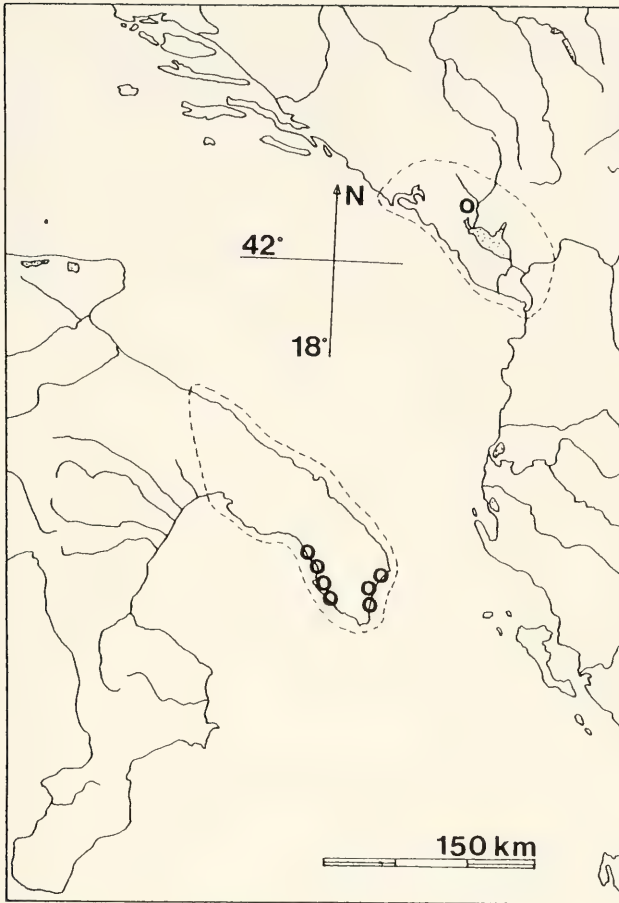
*Metacyclops stammeri* Kiefer, 1938 is clearly distinguishable from all species in the genus by the shape of Enp2P4 and Fu. Only *M. postojnae* Brancelj (1987) from Slovenia possesses similar Enp2P4, but it has different body habitus and shape of Fu. Similar body habitus and reduction of outer-middle seta



Figs 1-6. *Metacyclops stammeri* Kiefer, 1938. 1-5. ♂ (0.54 mm). 6. ♂ (0.593 mm). 1. Anal somite & Fu, dorsal view. 2. Abdomen, ventral view. 3. A1. 4. P5. 5. Mx. 6. Habitus, dorsal view. Scales: 0.1 mm.



Figs 7-12. *Metacyclops stammeri* Kiefer, 1938, ♂ (0.54 mm). 7. P4. 8. P6. 9. P3. 10. A2. 11. P1. 12. P2. Scales: 0.1 mm.



**Fig. 13.** Distribution of *Metacyclops stammeri* Kiefer, 1938 (circles: localities; broken line: supposed border of distribution).

on Fu has *M. trisetosus* (Herbst, 1957), described from Croatia and rediscovered in northern Italy by Stoch (1988), but it differs by the shape of P4, and the outer-middle seta on Fu is completely reduced in that species.

*M. stammeri* is one of the Tertiary relicts that have survived Quaternary cyclic periods of the ice ages in the subterranean waters. Its recent distribution (Fig. 13) is probably the consequence of the last ice age, which drove it into two refuge pockets (Apulian karstic peninsula, and Skadar karstic valley). Its return to the north areas in Balkan Peninsula is thwarted by geographical obstacles and also by the presence of three subterranean species from the genus *Metacyclops* in central and northern part of the Dinaric Alps: *M. trisetosus* (Herbst, 1957), *M. postojnae* Brancelj, 1987, and *M. gasparoi* Stoch, 1987. In Italy the most important obstacle probably is the distribution of main karstic areas (see Pesce 1985: fig. 1).

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